

Acute paraplegia after chiropraxis

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Abstract Spinal manipulation is a form of back and other musculoskeletal pain treatment that often involves a high-velocity thrust, a technique in which the joints are adjusted rapidly. The main objective of chiropractors is to correct spinal malalignment and relieve the nerves, allowing them to function optimally (Ernst In: Expert Rev Neurother 7:1451–1452, 2007; Oppenheim et al. In: Spine J 5:660–666, 2005). The evidence for the effectiveness of this treatment based on randomized clinical trials still remains uncertain (Cassidy et al. In: Spine 33(4 suppl): S176–S183, 2008; Dupeyron et al. In: Ann Readapt Med Phys 46:33–40, 2003; Ernst et al. In: Expert Rev Neurother 7:1451–1452, 2007; Hurwitz et al. In: J Manipulative Physiol Ther 27:16–25, 2007; Thiel et al. In: Spine 32: 2375–2378, 2007). Several case reports and series have been focusing on the risks of chiropraxis, especially on the cervical spine, although the risk/benefit ratio for certain selected patients could be acceptable (Powell et al. In: Neurosurgery 33:73–78, 1993). We describe the case of a 45-year-old woman who suffered complete paraplegia shortly after a chiropractic maneuver in the thoracic spine. Dorsal CT showed a calcified disc herniation at the T8–T9 level and MRI revealed a diffuse spinal cord ischemia from T6 to the conus medullaris without spinal cord compression at the level of herniation. Despite a normal arteriography, authors suggest a vascular injury as the cause of the deficit.

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Clinical case

A 45-year-old woman was admitted to the Neurosurgery Department of our hospital with the diagnosis of traumatic thoracic disc herniation and complete paraplegia of 12 h of evolution. She was first attended to in another hospital and then urgently sent to our department.

When the patient arrived at the emergency room, she had grade 0/5 motor strength in both the lower extremities, abolished deep tendon reflexes and complete sensory loss below the T8–T9 level. She had previously refused NASCIS protocol, which was offered at the first hospital, but she finally accepted it after being admitted to our department.

She had a history of only diffuse, not irradiated middle and low back pain and was being treated with chiropractic sessions for 2 years. On the day of onset of her paraplegia, she went to one of those sessions and suffered an unusual but temporary thoracic pain when the chiropractor was manipulating her middle thoracic zone. Approximately 20 min after the end of the session, she felt proximal weakness in her lower extremities, and the symptoms of a complete paraplegia and spine cord shock were progressively established within a 1–2-h period.

The blood and urinary analyses, including C-reactive protein levels and the globular sedimentation rate, were normal and the body temperature was 36.5°C.

A magnetic resonance imaging (MRI) performed at the hospital of origin 5 h after the beginning of the weakness showed two anomalies: one disc herniation (T8–T9) (Fig. 1a) and hypersignal under the T9 level in a T2

sequence (Fig. 1b). In this case, despite the initial radiologic diagnosis, the herniation was clearly not compressing the spinal cord in the MRI image, thus surgery of the hernia was not justified.

A CT scan of the cervical-thoracic-lumbar spine was performed to assess any fracture, luxation or bleeding. Nothing abnormal was detected except a left-calcified thoracic T8–T9 foraminal hernia, which was not narrowing the spinal canal (Fig. 2).

A second MRI (16 h after the beginning of the weakness), done with gadolinium contrast, revealed less T2 hypersignal but small petechia in the conus medullaris in a gradient-echo sequence (Fig. 3). There was no evidence of contrast hypercaptation or vascular abnormalities.

An urgent spinal cord arteriography was also performed, but there were no malformations or arteriovenous fistulas. The Adamkiewicz artery was identified at T9 on the left, as well as the calcified herniated disc.

With a treatment of bed rest and steroids, the patient did not recover either the strength or the sensory deficit. 15 days later, hyperreflexia and other pyramidalism signs with a T9 sensory loss level were established. A new MRI revealed a diffuse spinal cord ischemia from T6 to the conus medullaris (Fig. 4).

Compiling clinical and radiologic data, we considered that the final diagnosis was spinal cord ischemia due to a vertebral manipulation in a zone with a previously herniated and calcified disc. The exceptional finding was the

Fig. 1 **a** Saggital T1 MRI of the lumbar spine, performed 5 h after the beginning of the weakness, showing a herniated disc T8–T9 (arrow). **b** Saggital T2 MRI showing hypersignal under the T9 level (arrow)

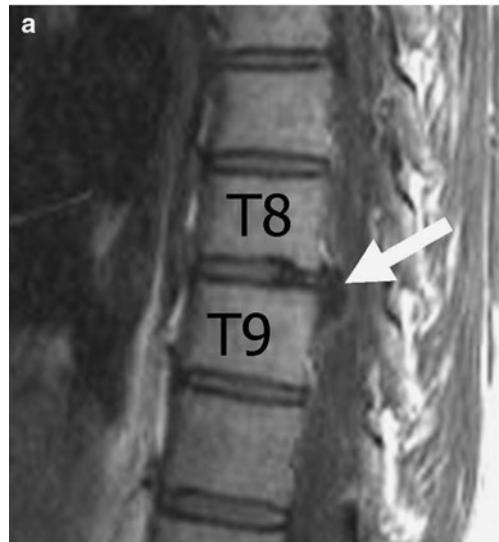


Fig. 2 Axial CT scan showing a calcified thoracic T8–T9 foraminal hernia (arrow)

absence of new traumatic complications and the severity of the symptoms.

Discussion

Spinal manipulation, particularly performed on the upper spine, is known to be associated with mild to severe complications [6, 11, 15, 16]. The literature reviewed by Patjin in 1991 showed a complication rate of 1 in 518,886



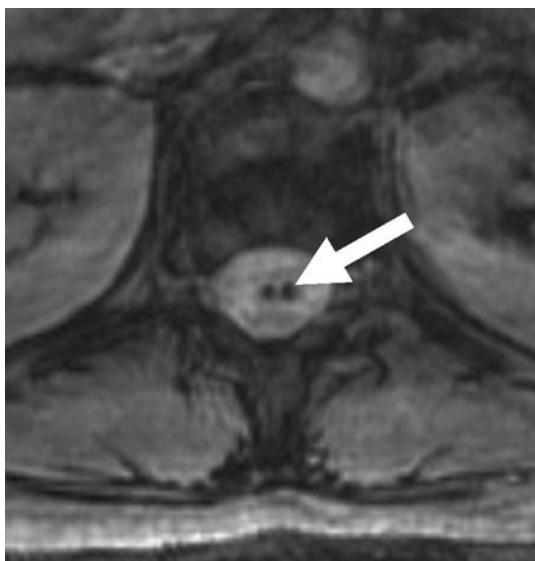


Fig. 3 Gradient-echo sequence MRI performed 16 h after the beginning of the weakness revealed small petechia in the conus medullaris (arrow)

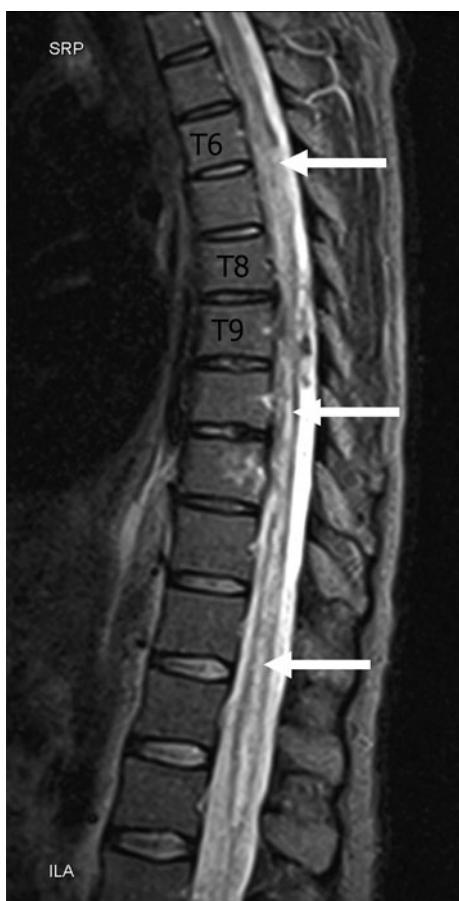


Fig. 4 An MRI performed 15 days after the beginning of the symptoms revealed a diffuse spinal cord ischemia from T6 to the conus medullaris (arrows)

procedures. The most frequent complications were vertebral artery injury (65.1%) and intervertebral disc complications (22.5%) [13]. An extensive literature review by Ernst [4] focusing on chiropractic complications revealed that the most frequent lesion reported was dissection of the vertebral arteries, and others included dural tear, edema, nerve injury, disc herniation, hematoma and bone fracture.

Referring to neurological complications, most series describe cases of vertebral artery dissection. To our knowledge, only one case series describes patients with neurologic, non-vascular complications after spinal manipulation [12]. In this series, 16 of the 18 patients had to be surgically treated; most of them underwent discectomy. None of the patients presented a case similar to the case we describe.

Kelwalramani et al. [8] described two cases, and Chung one case [2] of spinal cord damage without spinal column injury after chiropractic. In addition, Lipper [9] reported one Brown-Séquard syndrome with the same characteristics. All of them had an image of acute edema in MRI and the recovery was from satisfactory to good.

However, the MRI images of our case suggest ischemia rather than contusion. Morandi et al. [10] reported one similar case with established paraplegia from the beginning without neurologic recovery. There was no structure displacement like in our patient whose T9 disc was completely calcified. In the article, the authors discuss the probable physiopathology of the ischemia: arterial occlusion by a fibrin-platelet embolus, thrombus or disc material embolism.

We believe that spinal thoracic manipulation in a previously narrowed canal by a left T8–T9 herniated disc could have damaged the vascular wall of the Adamkiewicz artery (T9 left in this patient). This could be due to vaso-spasm or formation of a fibrin-platelet thrombus in the artery as seen in animal models [18]. As few minutes of ischemia are enough to produce permanent deficit, no filling defect was seen in arteriography.

Conclusions

We present an uncommon case of complete paraplegia after vertebral manipulation in which all etiologies requiring surgery were excluded with serial MRI, CT scan and arteriography. The MRI images suggest spinal cord ischemia, which has to be considered another possible complication of chiropraxis.

Conflict of interest statement None of the authors has any potential conflict of interest

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